

**DESCRIPTION OF THE LARVA OF *ATRACTELMIS*
(COLEOPTERA: ELMIDAE) AND NEW
INFORMATION ON THE MORPHOLOGY,
DISTRIBUTION, AND HABITAT OF
ATRACTELMIS WAWONA CHANDLER**

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Abstract.—Collection of additional specimens of *Atractelmis wawona* Chandler has allowed descriptions of the female and larva. The species' known geographic distribution is from northern California to southern Oregon and Idaho. Submerged aquatic mosses are the preferred microhabitat.

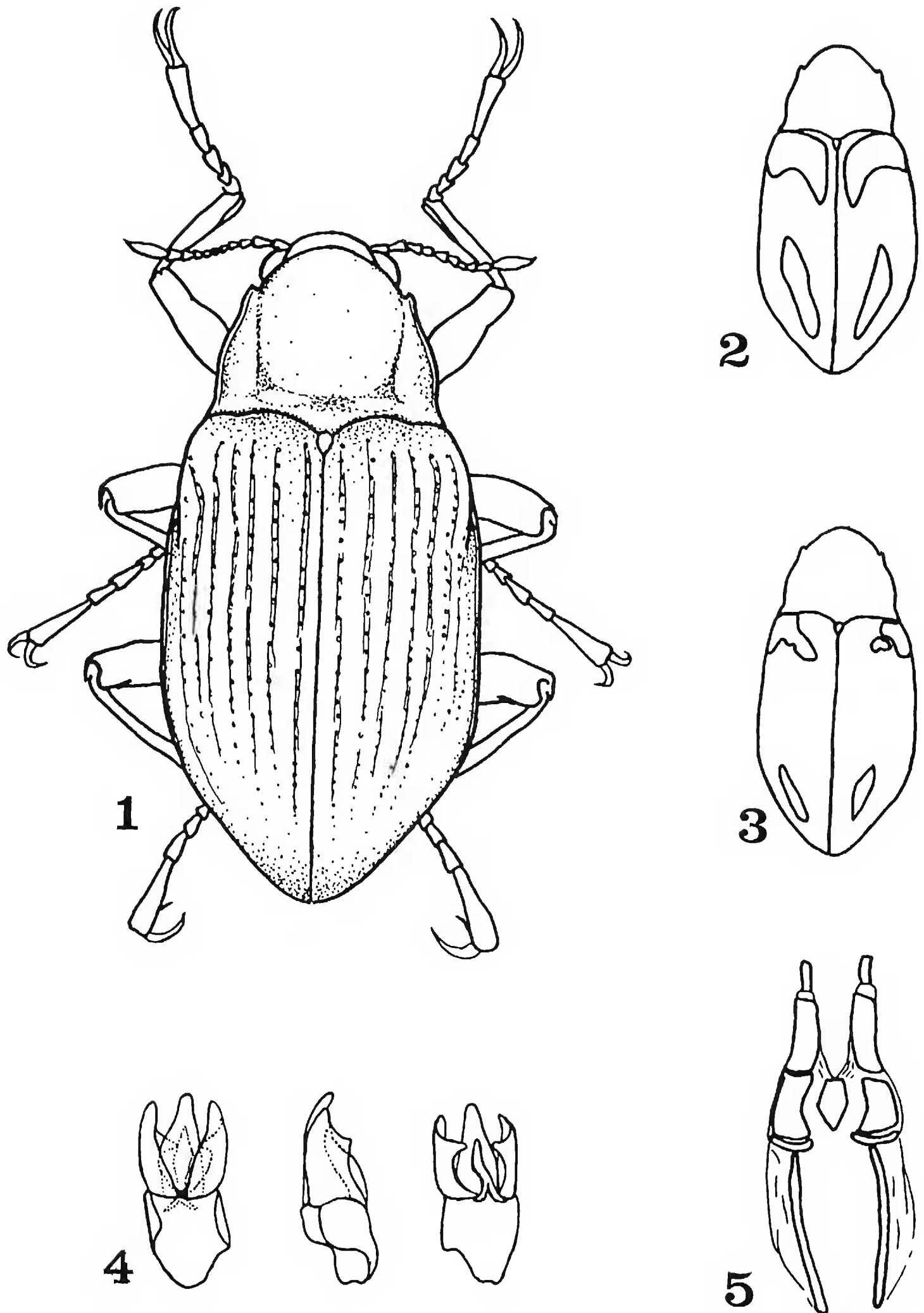
Key Words.—Insecta, Coleoptera, Elmidae, *Atractelmis*, descriptions, distribution, microhabitat

Atractelmis wawona Chandler for many years has been the most elusive riffle beetle in the Nearctic region. This monospecific genus was described from two specimens by Chandler in 1954. Despite serious attempts, it was not collected again until 1969, when Harley P. Brown took a single specimen at Wawona, California, the type locality. Sixteen years later, Brown collected a few more specimens from a new locality near Wildwood, California. We spent several years unsuccessfully searching for the species.

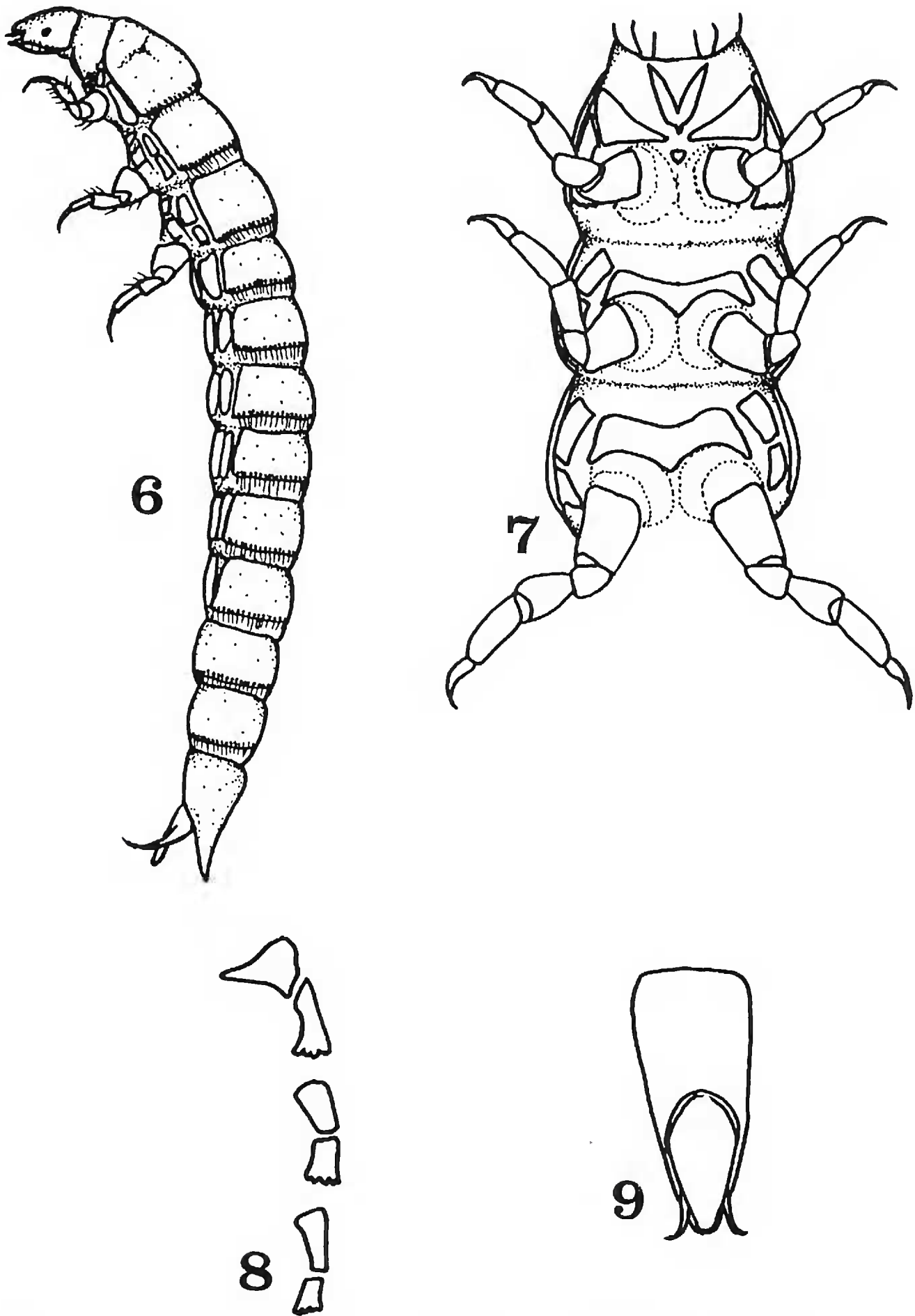
In 1988, a re-examination of the morphology of a specimen showed similarities to *Promoresia*, an eastern Nearctic genus that usually inhabits aquatic mosses. Careful examination of mosses at locations where *Atractelmis wawona* had been previously collected revealed this species to be present, and demonstrated its strong preference for inhabiting aquatic mosses. We now describe the female and larva, both of which were unavailable to Chandler.

ATRACTELMIS CHANDLER

Larva.—Body elongate (Fig. 6), hemicylindrical in cross section; dark brown; sclerites densely tuberculate, intersegmental membranes lightly sclerotized, tan; head prognathous; posterior border of thoracic and abdominal terga I–VIII with numerous tubercles bearing elongate stout plumose setae (giving intersegmental areas a fringed look). Mature length 4.8–5.0 mm. Head highly sclerotized, dark; dorsum very tuberculate; epicranial suture U-shaped with very short stem, arms ending near antennal bases; stemmata distinct; edge of frons straight, smooth. Each antenna three-segmented, each segment with apical setae; segment one as wide as long; segment two 3× as long as wide; segment three 3× as long as wide but one-third the size of segment two. Labrum transversely rectangular, with anterior border of several stout setae. Each mandible bluntly trifold; molar brush present. Each maxilla with galea and lacinia distinct, armed with a brush of stout medially-curved setae; palpus three-segmented, segment one as long as wide, segments two and three longer than wide, segment three with peg-like setae apically. Labium 2× as long as wide, apex truncate, one stout seta present on each side just anterior to middle; each palpus short, two-segmented, segments each as wide as long and having blunt apical setae. Cervical area lightly sclerotized; accessory sclerites (= cervical sclerites) greatly elongate, diverging anteriorly away from a single area (V-shaped) (Fig. 7). Thoracic terga with middorsal suture (or line); prothorax with a transverse triangular depression in anterior one-half on each side. Prosternum



Figures 1–5. Adult *Atractelmis wawona*. Figure 1. Habitus. Figure 2. Normal color pattern. Figure 3. Color pattern variant. Figure 4. Male genitalia in dorsal, lateral and ventral views. Figure 5. Female genitalia.



Figures 6–9. Larval *Atractelmis*. Figure 6. Habitus. Figure 7. Ventral thoracic structures. Figure 8. Left thoracic pleurites. Figure 9. Abdominal segment IX (ventral view) and operculum.

reduced to triangular sclerite between and anterior to procoxae; meso- and metasternum very transverse, lightly tuberculate. Pro-, meso-, and metathoracic pleurites divided into two sclerites (Fig. 8); prothoracic prepleurites with medial extensions that almost meet anterior to procoxae. All legs similar (Fig. 7), all coxal cavities open; each coxa conical, anterolaterally with several stout setae; trochanter well developed, subequal to femur; femur and tibia $2\times$ as long as wide, with numerous setae; tarsungulus bluntly pointed, having one stout seta on medial border. Abdomen nine-segmented; segments

I–VI with separate tergites, pleurites and sternites; segments VII–IX with all sclerites united into a ring. Middorsal line present on segments I–VIII. Segment IX $2\times$ as long as segment VIII, slightly truncate apically, dorsally slightly sinuate (lateral view), having an elongate pentagonal operculum (Fig. 9). Operculum with two posteroventrally directed claws on inner surface, and covering three tufts of perianal tracheal gills each with 7–10 gill filaments. Gill filaments furcate basally (most bifurcate, some trifurcate). Spiracles present on mature larva on sides of mesonotum and abdominal segments I–VIII.

Atractelmis wawona Chandler

Adult Morphology.—The pronotal sculpturing is quite distinct from that of any other Nearctic elmid (Fig. 1), particularly the bulbous disk and the transverse posterior sulcus. The color pattern exhibited by this species is remarkably invariable. Each humerus has a broad comma-shaped macula with the tail near the elytral suture (Fig. 2). The subapical maculae are elongate and directed medially posteriorly. The single variant color pattern we have found has the spots somewhat reduced in size (Fig. 3).

Chandler (1954) described the adult male well, except for one minor detail of the genitalia: the median piece has an elongately sinuate, Y-shaped sclerite on the ventral side (Fig. 4). Chandler's drawing has detail in this area that resembles sutures or folds in the membranes. We have found no external difference between the sexes. The female genitalia are typical for elmids (Fig. 5).

Habitat and Microhabitat

Larvae and adults of *A. wawona* co-occur. They are usually found in cool, small- to medium-sized, mountain streams; in these sites they are most numerous in aquatic mosses. The greatest number of specimens we have collected at once came from the moss *Platyhypnidium riparioides* (Hedwig) Dixon. However, we have also collected specimens from submerged roots of Indian rhubarb, *Peltiphyllum peltatum* (Torrey) Engler, and of riparian trees.

Geographical Distribution

Atractelmis wawona occurs throughout the northern half of California and parts of southern Oregon and Idaho. Although it is probably even more widely distributed, its restricted microhabitat has hidden it from those few who have searched for it, as noted by Chandler (1954).

Distribution Records.—CALIFORNIA. *HUMBOLDT Co.*: 1.6 km (1 mi) west of Dinsmore, Van Duzen River, 13 Jul 1988, W. D. Shepard, 2 adults and 1 larva. *MARIPOSA Co.*: nr Wawona, South fork of Merced River, 17 Jul 1946, H. P. Chandler, 1 adult (holotype); Wawona, South Fork of Merced River, 18 Jul 1969, H. P. Brown, 1 adult. *PLUMAS Co.*: 1.6 km (1 mi) NE of Indian Falls, Indian Creek, 19 Aug 1989, W. D. Shepard and C. B. Barr, 2 larvae. *SHASTA Co.*: Middle Fork of Cottonwood Creek, 24 Jun 1952, H. P. Chandler, 1 adult (paratype). *SHASTA-TEHAMA Co. Border*: Beegum, Beegum Creek, 12 Jul 1988, W. D. Shepard, 10 adults and 25+ larvae; same but 4 Sep 1988, W. D. Shepard and C. B. Barr, 5 adults and 31 larvae; 10.5 km (6.5 mi) S of Platina, North Fork of Beegum Creek, 17 Jul 1990, W. D. Shepard and C. B. Barr, 15 larvae. *SISKIYOU Co.*: 4.8 km (3 mi) SE of Cecilville, South Fork of Salmon River, 21 Jul 1990, W. D. Shepard and C. B. Barr, 11 adults and 1 larva. *TRINITY Co.*: 6.4 km (4 mi) W of Wildwood, Hayfork Creek, 12 Jul 1988, W. D. Shepard, 4 adults and 11 larvae; 3.2 km (2 mi) N of Wildwood, Hayfork Creek, 4 Sep 1988, W. D. Shepard and C. B. Barr, 62 adults and 25+ larvae; same but 17 Jul 1990, W. D. Shepard and C. B. Barr, 24 adults; below Wildwood, Gemmill Gulch, 23 Jun 1985, H. P. Brown, 3 adults; Mad River (town), (on the Mad River, 13 Jul 1988, W. D. Shepard, 1 larva. IDAHO. *ADAMS Co.*: 19.3 km (12 mi) N of New Meadows, Little Salmon River, 17 Aug 1989, W. D. Shepard and C. B. Barr, 3 adults and 11 larvae.

OREGON. CROOK Co.: 4.8 km W of Forest Service Headquarters, Meehan, Ochoco Creek, 26 Jul 1974, R. E. Miller, 1 adult.

DISCUSSION

Brown's (1972:62) key to the genera of aquatic dryopoid larvae of the United States can be modified to include *Atractelmis* as follows (we retain Brown's [1972] style for the key couplets below; the figure numbers listed refer to that work):

- 26 (25) Body robust, broad, subtriangular in cross section; with spatulate spines along lateral margins and mid-dorsal line (Figs. 169, 170):
Ampumixis
 Body long and slender, hemicylindrical; without prominent clusters of spines 26 A
- 26A (26) Abdominal segments 7 and 8 with no longitudinal sutures, segments 1–6 with pleurites; posterior border of nota and terga with tubercles having elongate setae well sclerotized: *Atractelmis*
 Abdominal segments 7 and/or 8 divided by tergo-sternal sutures, pleurites on segments 1–6 or 1–7; posterior border of tubercles with setae not or poorly sclerotized: *Cleptelmis*

Because *Atractelmis* was the last elm mid genus in the United States for which larvae were unknown, we now can concentrate on separating the species in the larval stage.

Adult morphological characters indicate that *Atractelmis* is closely related to *Cleptelmis*, *Rhizelmis* and *Ampumixis*. Externally, adult *Atractelmis* look most similar to adult *Rhizelmis* that are quadrimaculate. This morph of *Rhizelmis*, however, is equally as rare as *Atractelmis*. Fortunately, the two genera do not occur in the same microhabitat. Larval morphology links *Atractelmis* very strongly with *Cleptelmis*, and less strongly with *Ampumixis*. Larval synapomorphies shared with *Cleptelmis* include the number of abdominal pleurites, and the posterior fringe of tubercular setae on thoracic and abdominal segments (weakly developed in *Cleptelmis*). Habitat and/or microhabitat preferences of *Atractelmis* also show similarities to those of *Rhizelmis*, *Ampumixis* and, especially, *Cleptelmis*. In fact, the collection of any of these genera suggests that the others may be present also.

ACKNOWLEDGMENT

We thank Harley P. Brown (University of Oklahoma, Norman) for providing specimens for examination and information on his collection sites. We also greatly appreciate the support and encouragement he has extended through the years. Additionally, we thank William R. Buck (New York Botanical Garden, Bronx) for identifying our samples of aquatic moss.

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Received 17 December 1990; accepted 9 March 1991.